

FOREWORD

It is required by the Wireless Telegraphy Act 1949 that no radio apparatus shall be installed or used in the United Kingdom except under the authority granted by the Secretary of State. It is a condition of this authority that the performance of the apparatus must meet certain minimum standards. These minimum standards of performance are given in specifications prepared by the Radiocommunications Agency in consultation with the relevant manufacturers.

Applicants who wish to submit equipment for type testing should apply to one of the accredited test houses. A current list of accredited test houses and guidance for applicants is given in the TYPE APPROVALS INFORMATION GUIDE (Form RA207). This is available on request from the Radiocommunications Agency Library whose details are given below.

Equipment will be considered for approval purposes either:

- a) direct compliance with MPT1376; or
- b) compliance with any national standard or government regulation of any member state of the European Communities; or
- c) any relevant international standard or regulation recognised in a Member State of the European Communities;
- d) and where appropriate compliance with manufacturing rules and procedures of any Member State relating to quality control operations during manufacture of the equipment where they form part of a standard or technical regulations in a) to c) above;

provided that in case b) or c) the regulation is deemed to comply with MPT1376.

The results of tests to such a standard will be taken into consideration if carried out by

This specification does not take into consideration the requirements of the EMC directive 89/336 EEC. In the future, equipment may need to be tested to additional standards to fulfil the requirements of this directive.

INTRODUCTION

This standard is intended to specify the co-existence requirements and associated methods of measurement for radio equipment for use in the land mobile service as specified in the Scope.

Clause 4 provides the corresponding limits. These limits have been chosen to minimise harmful interference to other equipment and services. They are based on the interpretation of the measurement results described in sub-clause 3.3.

This standard will also be used by accredited test laboratories for the assessment of the performance of the equipment. The performance of the equipment submitted for type testing shall be representative of the performance of the corresponding production model. In order to avoid any ambiguity in that assessment, this standard contains instructions for the presentation of equipment for type testing purposes, clause 3, methods of measuring, clauses 7 and 8, and conditions clauses 5 and 6.

This standard was drafted on the assumption that:

- the type test measurements will be performed only once, in one of the accredited test laboratories in order to grant type approval,
- if equipment available on the market is required to be checked it shall be tested in accordance with the methods of measurement specified in this standard.

This standard covers base stations, mobile stations and two categories of handportable stations. One category is fitted with a 50 Ω external antenna socket or connector. The other category has no external antenna socket, but:

- either it is fitted with a permanent internal 50 Ω RF connector,
- or it can be fitted with a temporary internal 50 Ω RF connector, so that conducted measurements can be performed.

The means to access and/or implement the internal connector shall be provided by the manufacturer.

Details of the means used during type testing shall be provided by the accredited test laboratory with the test report (sub-clause 3.1.12).

1. SCOPE

This standard covers the co-existence requirements for radio transmitters and receivers used at fixed and/or mobile stations in the Private Mobile Radio service. It applies to use in the land mobile service, operating on radio frequencies between 30 MHz and 3 GHz, with channel separations of 5 kHz and intended for speech and/or data.

In this standard different requirements are given for the different radio frequency bands, environmental conditions and types of equipment where appropriate.

In this standard, data transmission systems are defined as systems which transmit and/or receive data and/or digitised voice. The equipment shall comprise a transmitter and associated encoder and modulator and/or a receiver and associated demodulator and decoder.

The types of equipment covered by this standard as follows:

Base station : equipment fitted with antenna socket.

Mobile station : equipment fitted with antenna socket.

Handportable stations:

a) fitted with an antenna socket,

or

b) without an external antenna socket (integral antenna equipment) but fitted with a permanent internal or a temporary internal 50Ω RF connector which allows access to the transmitter output and the receiver input.

For the type of equipment defined in (b) the additional measurements which shall be made using the equipment antenna connected to the station (and not using any connector) are as follows:

Transmitter effective radiated power;

Transmitter radiated spurious emissions;

Receiver maximum usable sensitivity (field strength);

Receiver spurious radiations.

Handportable station equipment without an external or internal RF connector and without the possibility of having a temporary internal 50Ω RF connector is not covered by this standard.

2. DEFINITIONS, ABBREVIATIONS AND SYMBOLS

2.1 Definitions

For the purpose of this standard the following definitions apply.

Base Station.

Equipment fitted with an antenna socket, for use with an external antenna and intended for use in a fixed location.

Mobile Station.

Mobile equipment fitted with an antenna socket, for use with an external antenna, normally used in a vehicle or as a transportable station.

Handportable Station.

Equipment either fitted with an antenna socket or an integral antenna, or both, normally used on a stand-alone basis, to be carried on a person or held in the hand.

Audio frequency input socket.

The socket normally intended for connection to a microphone for the purpose of voice transmission. (In some cases, this socket could be expected to be used for the input of an audio sub-carrier, modulated to carry data, such as FFSK.)

Facilities socket.

Any socket intended for purposes other than the transmission of voice. The purpose of the socket and required input signals shall be specified by the manufacturer.

Integral Antenna.

An antenna designed to be connected to the equipment without the use of a 50Ω external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

Full tests.

In all cases except where qualified as "limited", tests shall be performed according to this standard. The receiver tests performed will be selected from clause 8, as appropriate depending upon whether the equipment is intended for either analogue voice or data/digitised voice reception. In the case where equipment is capable of both analogue voice and data reception, both sets of tests shall be conducted.

Limited tests.

The limited tests are as follows:

- receiver maximum usable sensitivity (conducted) (sub-clauses 8.1, and 8.3),
- receiver maximum usable sensitivity (field strength) (sub-clauses 8.2, and 8.4),
integral antenna equipment only,
- receiver near channel selectivity (sub-clause 8.5),
- transmitter peak envelope power (conducted) (sub-clause 7.1)

- transmitter effective radiated power (sub-clause 7.2), integral antenna equipment only
- transmitter near channel power (sub-clause 7.3)

Conducted measurements.

Measurements which are made using direct 50Ω connection to the equipment under test.

Radiated measurements.

Measurements which involve the absolute measurement of a radiated field.

2.2. Abbreviations

SINAD:	(signal + noise + distortion)/(noise + distortion)
dB:	decibel
dBm:	dB relative to 1 mW
dBμV:	dB relative to 1 μV
RF:	radio frequency
Tx:	transmitter
Rx:	receiver
ETS:	European Telecommunication Standard
I-ETS:	Interim ETS
PSTN:	Public switched telephone network
EMC:	Electromagnetic compatibility
EEC:	European Economic Community
ETSI:	European Telecommunications Standards Institute
BS:	British Standard
e.m.f.:	electro-motive force
AC:	alternating current
r.m.s.:	root mean square
Bit:	Binary digit

2.3 Symbols

E ₀ :	reference field strength, (Annex A),
R ₀ :	reference distance, (Annex A),
P _X :	peak envelope power
λ:	wavelength

3. GENERAL

3.1 Presentation of equipment for testing purposes

Each equipment submitted for type testing shall fulfil the requirements of this standard on all channels over which it is intended to operate.

To simplify and harmonise the type testing procedures between the different test laboratories, measurements shall be performed, according to this standard, on samples of equipment defined in sub-clauses 3.1.1 to 3.1.12.

These clauses are intended to give confidence that the requirements set out in this standard have been met without the necessity of performing measurements on all channels.

3.1.1 Choice of model for type approval

The manufacturer shall provide one or more production model(s) of the equipment, as appropriate for type approval testing.

The second category corresponds to an alignment range, of the receiver and transmitter, which is greater than 10% of the highest frequency of the alignment range for equipment on frequencies up to 500 MHz, or greater than 5% for equipment operating above 500 MHz. This category is defined as AR2.

3.1.4 Choice of frequencies

The frequencies for testing shall be chosen by the manufacturer in consultation with the accredited test house, in accordance with sub-clauses 3.1.5 to 3.1.11, see also Annex C. The manufacturer selects the frequencies for testing and will ensure that the chosen frequencies are within one or more of the national bands for which type approval is required.

3.1.5 Testing of single channel equipment of category AR1

In the case of equipment of the category AR1, one sample of the equipment shall be tested. Full tests shall be carried out on a channel within 100 kHz of the centre frequency of the alignment range.

3.1.6 Testing of single channel equipment of category AR2

In the case of equipment of the category AR2, three samples of the equipment shall be tested. Tests shall be carried out on a total of three channels.

The frequency of the channel of the first sample shall be within 100 kHz of the highest frequency of the alignment range.

The frequency of the channel of the second sample shall be within 100 kHz of the lowest frequency of the alignment range.

The frequency of the channel of the third sample shall be within 100 kHz of the centre frequency of the alignment range.

Full tests shall be carried out on all three channels.

3.1.7 Testing of two channel equipment of category AR1

In the case of equipment of category AR1, one sample of the equipment shall be tested. Tests shall be carried out on the two channels.

The frequency of the upper channel shall be within 100 kHz of the highest frequency of the switching range. The frequency of the lower channel shall be within 100 kHz of the lowest frequency of the switching range. In addition the average of the frequencies of the two channels shall be within 100 kHz of the centre frequency of the alignment range.

Full tests shall be carried out on the upper channel and limited tests on the lower channel.

3.1.8 Testing of two channel equipment of category AR2

In the case of equipment of the category AR2, three samples of the equipment shall be tested. Tests shall be carried out on a total of four channels.

The highest frequency of the switching range of one sample shall be within 100 kHz of the centre frequency of the alignment range. The frequency of the upper channel shall be within 100 kHz of the highest frequency of the switching range and the frequency of the lower channel shall be within 100 kHz of the lowest frequency of the switching range.

Full tests shall be carried out on the upper channel and limited tests on the lower channel.

The frequency of one of the channels of the second sample shall be within 100 kHz of the highest frequency of the alignment range.

Full tests shall be carried out on this channel.

The frequency of one of the channels of the third sample shall be within 100 kHz of the lowest frequency of the alignment range.

Full tests shall be carried out on this channel.

3.1.9 Testing of multi channel equipment (more than two channels) of category AR1

In the case of equipment of the category AR1, one sample of the equipment shall be tested.

The centre frequency of the switching range of the sample shall correspond to the centre frequency of the alignment range.

Full tests shall be carried out on a frequency within 100 kHz of the centre frequency of the switching range. Limited tests shall be carried out within 100 kHz of the lowest and also within 100 kHz of the highest frequency of the switching range.

3.1.10 Testing of multi channel equipment (more than two channels) of category AR2 (switching range less than alignment range)

In the case of equipment of the category AR2, three samples of the equipment shall be tested. Tests shall be carried out on a total of five channels.

The centre frequency of the switching range of one sample shall be within 100 kHz of the centre frequency of the alignment range. The frequency of the upper channel shall be within 100 kHz of the highest frequency of the switching range and the frequency of the lower channel shall be within 100 kHz of the lowest frequency of the switching range.

Full tests shall be carried out on the centre channel and limited tests on the upper and lower channel.

The frequency of one of the channels of the second sample shall be within 100 kHz of the highest frequency of the alignment range.

Full tests shall be carried out on this channel.

The frequency of one of the channels of the third sample shall be within 100 kHz of the lowest frequency of the alignment range.

Full tests shall be carried out on this channel.

3.1.11 Testing of multi channel equipment (more than two channels) of category AR2 (switching range equals the alignment range)

In the case of equipment of the category AR2, one sample of the equipment shall be tested.

The centre frequency of the switching range of the sample shall correspond to the centre frequency of the alignment range.

Full tests shall be carried out on a frequency within 100 kHz of the centre frequency of the switching range and within 100 kHz of the lowest and also within 100 kHz of the highest frequency of the switching range.

3.1.12 Testing of equipment without an external 50Ω RF connector.

3.1.12.1 Equipment with a permanent or temporary internal 50Ω antenna connector

The means to access and/or implement the internal permanent or temporary 50Ω antenna connector shall be stated by the manufacturer with the aid of a diagram. The fact that use has been made of the internal antenna connection to facilitate measurements shall be recorded in the test report.

3.1.12.2 Equipment with a temporary antenna connector

The manufacturer, or an authorised representative, may submit one set of equipment with the normal antenna connected, to enable the radiated measurements to be made. The manufacturer, or an authorised representative, shall attend the test laboratory at conclusion

3.2.4 Marking

The equipment shall be marked in a visible place. This marking shall be legible, tamper-proof and durable.

The marking shall include:

- the name of the manufacturer or his trade mark,
- the type number of designation and serial number,
- the type approval number (when allocated by appropriate authorities).

3.3 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in this standard shall be as follows.

- a) The measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the standard.
- b) The measurement uncertainty value for the measurement of each parameter shall be included in the test report.
- c) The recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in clause 9 (table of measurement uncertainty).

NOTE:

This procedure for using Maximum Acceptable Uncertainty values is valid until superseded by other appropriate publications covering this subject. The use of the measured value has been chosen because there is no other definitive standard covering the subject at the time of publication of this standard. Therefore the measurement uncertainty shall be used as a quality of the actual measurement.

3.4 Transmitter power

If the equipment is designed to operate with different transmitter powers, the rated power for each level or range of levels shall be declared by the manufacturer. The power adjustment control shall not be accessible to the user.

The requirements of this standard shall be met for all power levels at which the transmitter is intended to operate. For practical reasons, measurements shall be performed only at the lowest and highest power levels at which the transmitter is intended to operate.

3.5 Facilities sockets

Where a facilities socket is provided the manufacturer shall state the purpose of the socket and nature of the required input signal. The transmitter tests, clause 7 shall be repeated with this input signal applied to the facilities socket.

4. TECHNICAL CHARACTERISTICS

This section contains the limit values of the parameters defined in clauses 7 and 8.

4.1 Transmitter parameter limits

4.1.1 Peak envelope power (PX) (Conducted)

This measurement applies only to equipment with an external 50 Ω antenna connector.

For the definition and the method of measuring see sub-clause 7.1

The PX under normal test conditions shall be within ± 1.5 dB of the rated value of the transmitter PX.

The PX under extreme test conditions shall be within + 2 dB and - 3 dB of the rated output power.

4.1.2 Effective radiated power

This measurement applies only to equipment without an external 50 Ω antenna connector.

For the definition and the method of measuring see sub-clause 7.2.

The effective radiated power under normal test conditions shall be within ± 7.5 dB of the rated effective radiated power.

The measurement shall be carried out under normal conditions only.

4.1.3 Near channel power

For the definition and the method of measuring see sub-clause 7.3.

The power in each adjacent channel shall not exceed a value of 60 dB below the rated PX without the need to be below 0.2 μ W, under both normal and extreme conditions.

The power in each channel, centred 10 kHz from the nominal channel centre, shall not exceed a value of 60 dB below the rated PX without the need to be below 0.2 μ W, under both normal and extreme conditions.

In any 5 kHz bandwidth centred not less than 12.5 kHz and not more than 1 MHz from the nominal channel centre, the noise power shall not exceed -65 dB relative to the rated PX.

4.1.4 Spurious emissions

For the definition and the method of measuring see sub-clause 7.4

The power of any spurious emission, occurring more than 12.5 kHz from the centre of the channel on which the transmitter is intended to operate, shall not exceed the values given in tables 1 and 2.

Table 1: conducted emissions

Frequency range	9 kHz to 1 GHz	above 1 GHz to 4 GHz, or above 1 GHz to 12.75 GHz see sub-clause 7.4.2
Tx operating	0.25 μ W (-36.0 dBm)	1.0 μ W (-30.0 dBm)
Tx Standby	2.0 nW (-57.0 dBm)	20.0 nW (-47.0 dBm)

Table 2: radiated emissions

Frequency range	30 MHz to 1 GHz	above 1 GHz to 4 GHz
Tx operating	0.25 μ W (-36.0 dBm)	1.0 μ W (-30.0 dBm)
Tx Standby	2.0 nW (-57.0 dBm)	20.0 nW (-47.0 dBm)

In the case of radiated measurements for handportable stations the following conditions apply:

- internal integral antenna: the normal antenna shall be connected,
- external antenna socket: an artificial antenna (sub-clause 6.2) shall be connected to the socket for the test.

4.1.5 Intermodulation attenuation

This requirement applies only to transmitters to be used in base stations (fixed).

For the definition and the method of measuring see sub-clause 7.5.

Two classes of transmitter intermodulation attenuation are defined, the equipment shall fulfil one of the following requirements.

- The intermodulation attenuation ratio shall be at least 40.0 dB for any intermodulation component.
- For base station equipment to be used in special service conditions (eg at sites where more than one transmitter will be in service) or when the regulatory authority makes it a condition of the licence, the intermodulation attenuation ratio shall be at least 70.0 dB for any intermodulation component. In the case where the performance is achieved by additional internal or external isolating devices (such as circulators) these shall be supplied at the time of type testing and shall be used for the measurements.

4.2 Receiver parameter limits

4.2.1 Maximum usable sensitivity

4.2.1.1 Maximum usable sensitivity (analogue, conducted)

For the definition and the method of measuring see sub-clause 8.1.

The maximum usable sensitivity shall not exceed an e.m.f of 6.0 dB μ V under normal test conditions, and an e.m.f of 12.0 dB μ V under extreme test conditions.

4.2.1.2 Maximum usable sensitivity (analogue, field strength)

This measurement applies only to equipment without a 50 Ω external antenna connector.

For the definition and method of measuring see sub-clause 8.2

The maximum usable sensitivity shall not exceed the field strength value shown in Table 3.

Table 3: Maximum usable sensitivity (analogue)

Frequency Band MHz.	Field strength in dB relative to 1 μ V/m
	Normal test conditions
30 to 100	14.0
100 to 230	20.0
230 to 470	26.0
470 to 3000	32.0

4.2.1.3 Maximum usable sensitivity (data, conducted)

For the definition and method of measuring see sub-clause 8.3

The maximum usable sensitivity shall not exceed an e.m.f. of 3.0 dB μ V under normal test conditions and 9.0 dB μ V under extreme test conditions for equipment operating with data rates of up to 2400 bits per second. The maximum usable sensitivity of equipment operating at data rates of above 2400 bits per second shall perform according to the manufacturer's declaration.

4.2.1.4 Maximum usable sensitivity (data, field strength)

This measurement applies only to equipment without a 50 Ω external antenna connector.

For the definition and method of measuring see sub-clause 8.4

The maximum usable sensitivity shall not exceed the field strength value shown in table 4.

Table 4: Maximum usable sensitivity (data)

Frequency band MHz	Field strength in dB relative to 1 μ V/m (Normal test conditions)
30 to 100	11.0
100 to 230	17.0
230 to 470	23.0
470 to 3000	29.0

4.2.2 Near channel selectivity

For the definition and the method of measuring see sub-clause 8.5

The near channel selectivity shall not be less than the values shown in Table 5.

Table 5: Near channel Selectivity

Frequency offset between wanted and unwanted signals (kHz)	Selectivity (dB)	
	Normal test conditions	Extreme test conditions
3	40	35
5	50	45
10	60	50

4.2.3 Spurious response rejection

For the definition and the method of measuring see sub-clause 8.6

At any frequency separated from the nominal frequency of the receiver by more 12.5 kHz, the spurious response rejection ratio shall not be less than 70.0 dB.

4.2.4 Intermodulation response rejection

For the definition and the method of measuring see sub-clause 8.7

The intermodulation response rejection ratio shall not be less than 70.0 dB for base stations and 65.0 dB for mobile and handportable stations.

4.2.5 Blocking or desensitisation

For the definition and the method of measuring see sub-clause 8.8

The blocking ratio, for any frequency within the specified ranges, shall not be less than 84 dB, except at frequencies on which spurious responses are found, sub-clause 8.6

4.2.6 Spurious radiations

For the definition and the method of measuring see sub-clause 8.9

The power of any spurious radiations shall not exceed the values given in Tables 6 and 7.

Table 6: conducted components

Frequency range	9 kHz to 1 GHz	above 1 GHz to 4 GHz, or above 1 GHz to 12.75 GHz, see sub-clause 8.9.2
Limit	2.0 nW (-57.0 dBm)	20.0 nW (-47.0 dBm)

Table 7: radiated components.

Frequency range	30 MHz to 1 GHz	above 1 GHz to 4 GHz
Limit	2.0 nW (-57.0 dBm)	20.0 nW(-47.0 dBm)

In the case of radiated measurements for handportable stations the following conditions apply:

- internal integral antenna: the normal antenna shall be connected,
- external antenna socket: an artificial load shall be connected to the socket for the test.

5. TEST CONDITIONS, POWER SOURCES AND AMBIENT TEMPERATURES

5.1 Normal and extreme test conditions

Type approval tests shall be made under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in sub-clauses 5.2 to 5.5.

5.2 Test power source

During type approval tests the power source of the equipment shall be replaced by a test

The frequency of the test power source corresponding to the AC mains shall be between 49 and 51 Hz.

5.3.2.2 Regulated lead-acid battery power sources used on vehicles

When the radio equipment is intended for operation from the usual types of regulated lead-acid battery power source used on vehicles the normal test voltage shall be 1.1 times the nominal voltage of the battery (6V, 12V etc).

5.3.2.3 Other power sources

For operation from other power sources or types of battery (primary or secondary), the normal test voltage shall be that declared by the equipment manufacturer.

5.4 Extreme test conditions

5.4.1 Extreme temperatures

For tests at extreme temperatures, measurements shall be made in accordance with the procedures specified in sub-clause 5.5, at the upper and lower temperatures of one of the following ranges:

- -25°C to +55°C
- -15°C to +55°C
- -10°C to +55°C

Type approval test reports shall state which range is used.

5.4.2 Extreme test source voltages

5.4.2.1 Mains voltage

The extreme test voltage for equipment to be connected to an AC mains source shall be the nominal mains voltage $\pm 10\%$.

5.4.2.2 Regulated lead-acid battery power sources used on vehicles

When the equipment is intended for operation from the usual types of regulated lead-acid battery power sources used on vehicles the extreme test voltages shall be 1.3 and 0.9 times the nominal voltage of the battery (6V, 12V etc).

5.4.2.3 Power sources using other types of batteries

The lower extreme test voltages for equipment with power sources using the following batteries shall be:

- for the Leclanché or lithium type: 0.85 times the nominal battery voltage,
- for the mercury or nickel-cadmium type: 0.9 times the nominal battery voltage.

No upper extreme test voltages apply.

5.4.2.4 Other power sources

For equipment using other power sources, or capable of being operated from a variety of power sources, the extreme test voltages shall be those agreed between the equipment manufacturer and the testing authority and shall be recorded in the test report.

5.5 Procedure for tests at extreme temperatures

Before measurements are made the equipment shall have reached thermal balance in the test chamber. The equipment shall be switched off during the temperature stabilising period.

In the case of equipment containing temperature stabilisation circuits designed to operate

6. GENERAL CONDITIONS

6.1 Normal test signals

6.1.1 Transmitter normal test signals (A1) and (B1)

Normal test signal (A1) shall consist of a sinusoidal input signal at a frequency of 1 kHz and at a level which drives the transmitter into its compression region. This should be determined by increasing the level of the test signal until the modulation depth or index ceases to increase.

For tests on analogue equipment via the audio frequency input socket terminals, normal test signal (B1) shall consist of two sinusoidal input signals selected by the test house with a separation between them which exercises the transmitter to the full modulation bandwidth as declared by the manufacturer. Each of these signals would independently drive the transmitter into its compression region.

For tests via any facilities sockets, normal test signal (B1) shall be of the nature described by the manufacturer for the purpose of the socket (see sub-clause 3.5), at a level which drives the transmitter into its compression region. This should be determined by increasing the level of the test signal until the modulation depth or index ceases to increase.

For tests on digital equipment, normal test signal (B1) shall consist of a pseudo-random bit sequence of at least 511 bits (according to CCITT Recommendation 0.153), at the appropriate data rate.

6.1.2 Receiver normal test signal

The normal test signal shall be agreed between the test house and the equipment manufacturer such that it represents the output from the transmitter and provides the necessary input for correct operation of the receiver. The test signal used shall be such as to produce a 1 kHz tone at the output of the receiver. Details of the test signal used shall be recorded in the test report.

6.1.3 Test signals for data (and digitised voice) equipment

When the equipment is designed to transmit continuous bit streams (e.g. data, facsimile, image transmission, digitised voice) the normal test signal shall be generated using a method as agreed between the test house and the equipment manufacturer and shall be as follows:

Signal M2, consisting of a radio frequency carrying a pseudo-random bit sequence of at least 511 bits (according to CCITT Recommendation 0.153).

Signal M3, consisting of a radio frequency signal, modulated with a pseudo-random bit sequence using a BPSK data format at 2300 Hz with $\sigma = 0.1$. This signal is used as an unwanted signal.

In this case the encoder, which is associated with the transmitter, shall be capable of supplying the normal test signal. The resulting modulation is called the normal test modulation. If possible this should be continuous modulation for the duration of the measurements.

6.2 Artificial antenna

Tests shall be carried out using an artificial antenna which shall be a substantially non-reactive, non-radiating load of 50Ω connected to the antenna connector.

6.3 Peak envelope power (PX)

The average power supplied to the artificial antenna by a transmitter during one radio frequency cycle at the highest crest of the modulation envelope.

6.4 Encoder for receiver measurements

Whenever needed and in order to facilitate measurements on the receiver, an encoder for the data system shall accompany the model submitted, together with details of the normal modulation process. The encoder will be used to generate the test signal using a method as agreed between the test house and the equipment manufacturer.

In the case of equipment unable to operate with continuous bit streams, the encoder shall be capable of operation in a repetitive mode, with intervals between each message that are not less than the reset time of the receiver.

Complete details of all codes and code format(s) used shall be given.

6.5 Modulation processing

Modulation processing networks, if included in the transmitter, shall be operative unless otherwise specified.

6.6 Test sites and general arrangements for radiated measurements

For guidance on radiation test sites see Annex A. Detailed descriptions of the radiated measurement arrangements are included in this annex.

6.7 Transmitter automatic shut-off facility

If the equipment is fitted with an automatic transmitter shut-off facility it shall be made inoperative for the duration of the type test.

6.8 Arrangement for test signals at the input of the transmitter.

For the purpose of this specification, the transmitter audio frequency modulation signal shall be applied to the terminals of the audio input socket with any microphone disconnected, unless otherwise stated.

6.9 Arrangement for test signals at the input of the receiver

Test signal sources which are applied to the receiver shall present an impedance of 50Ω to the receiver input. This requirement shall be met irrespective of whether one or more signals using a combining network are applied to the receiver simultaneously.

The levels of the test signals shall be expressed in terms of the e.m.f at the receiver input connector.

The effects of any intermodulation products and noise produced in the test signal sources shall be negligible.

6.10 Receiver mute or squelch facility

If the receiver is equipped with a mute or squelch circuit, this shall be made inoperative for the duration of the type approval tests.

6.11 Receiver rated audio output power

The rated audio output power shall be the maximum power, declared by the manufacturer, for which all the requirements of this standard are met. With receiver normal test signal (sub-clause 6.1.2), the audio output power shall be measured in a resistive load simulating the load with which the receiver normally operates. The value of this load shall be declared by the manufacturer.

6.12 Facilities for access

6.12.1 Analogue access

In order to simplify the measurements in sub-clauses 8.2 and 8.6 temporary access to a point where the amplitude of the analogue output of the RF part can be measured should be provided, e.g. IF output or the demodulated subcarrier point may be provided for the equipment to be tested. This access can be used to determine the frequency where a spurious response is expected.

6.12.2 Raw bit stream access

The raw bit stream is the stream of bits at the modulator input or the demodulator output. In order to make the measurements according to clauses 7 and 8 an access to the raw bit stream (physical layer) should be provided for the equipment to be tested.

6.12.3 Coupling arrangements

If the equipment does not have an external antenna connection, arrangements shall be made by the manufacturer to couple the unit to be tested to the test equipment by a method which does not affect the radiated field (e.g. acoustic, ultrasonic or optical) and according to the sub-clauses 6.12.2.1 and 6.12.2.2.

7. METHODS OF MEASUREMENT FOR TRANSMITTER PARAMETERS

7.1 Peak envelope power (conducted)

It is assumed that the maximum value of the effective radiated PX in an operating system will be a condition of the licence.

7.1.1 Definition

The rated value of the transmitter PX is the maximum value of the total output power for any conditions of modulation for which all the relevant specification requirements are met. The rated value of the transmitter PX shall be declared by the manufacturer.

7.1.2 Method of measurement

This method applies only to equipment with an external 50Ω antenna connector.

The transmitter shall be connected to a 50Ω power attenuator, and the peak envelope power delivered to this artificial antenna shall be measured.

Normal test signal (B1) (sub-clause 6.1.1) shall be applied at the transmitter. The PX shall then be measured.

The measurement shall be made under normal test conditions (sub-clause 5.3) and repeated under extreme test conditions (sub-clauses 5.4.1 and 5.4.2) applied simultaneously.

The transmitter shall be switched on with normal test signal (B1) (see sub-clause 6.1.1) applied and the measuring receiver shall be tuned to the centre frequency of the channel on which the transmitter is intended to operate.